Health at a Glance

Adjusting the scales: Obesity in the Canadian population after correcting for respondent bias

by Tanya Navaneelan and Teresa Janz

Highlights

- One in four adult Canadians, or about 6.3 million people, were obese in 2011–2012. Since 2003, the proportion of Canadians who were obese has increased 17.5%.
- More men than women were obese, and obesity has increased more for men than women over the past eight years.
- The lowest proportions of obese people were found in Canada's three largest cities (Toronto, Montréal, Vancouver) and in areas of southern British Columbia; the highest levels were found in Atlantic Canada, the Prairies, the Territories, and smaller cities in northern and southwestern Ontario.

Obesity is best described as a condition in which excess body fat has accumulated to such an extent that a person's health may be adversely affected. Obesity has become one of the world's greatest health concerns and threatens to undo gains made in life expectancy during the 20th century.[1,2] An extensive body of research has found associations between excess body weight and numerous chronic conditions, including type 2 diabetes, hypertension, cardiovascular disease, gallbladder disease and certain types of cancer. Nevertheless, the amount of excess fat, its distribution throughout the body, and the associated health consequences, can vary considerably between individuals.[3,4] Despite cultural norms that stigmatize excess weight, and strong evidence of its adverse health effects, the prevalence of obesity continues to rise.[5]

This paper presents obesity estimates adjusted for certain biases in self-reported data. Adjusted estimates for adult Canadians by age, sex, and geography, that have not been previously reported, are provided using data from the Canadian Community Health Survey (CCHS).[6]

Why adjust self-reported data?

At Statistics Canada, obesity is determined in health surveys using the body mass index (BMI), a relative measure of weight and height (see **About the body mass index**). BMI can be computed using self-reported values, where the

respondent is asked their height and weight, or by directly measuring respondents' height and weight.

Although directly measured data provide more accurate estimates of obesity it is more costly and time-consuming to gather. Gathering measured data means interviewers require special training, and people may be less likely to participate because they find it more intrusive.

Self-reported data is less expensive and easier to gather than measured data: this is beneficial when sampling large numbers of people. However, self-reported data is subject to respondent biases—people may not know their height or weight or their response may reflect perceived social and cultural norms about the ideal height and weight. Consequently, people tend to underestimate their weight and overestimate their height, resulting in an underestimation of the prevalence of obesity.[7,8,9]

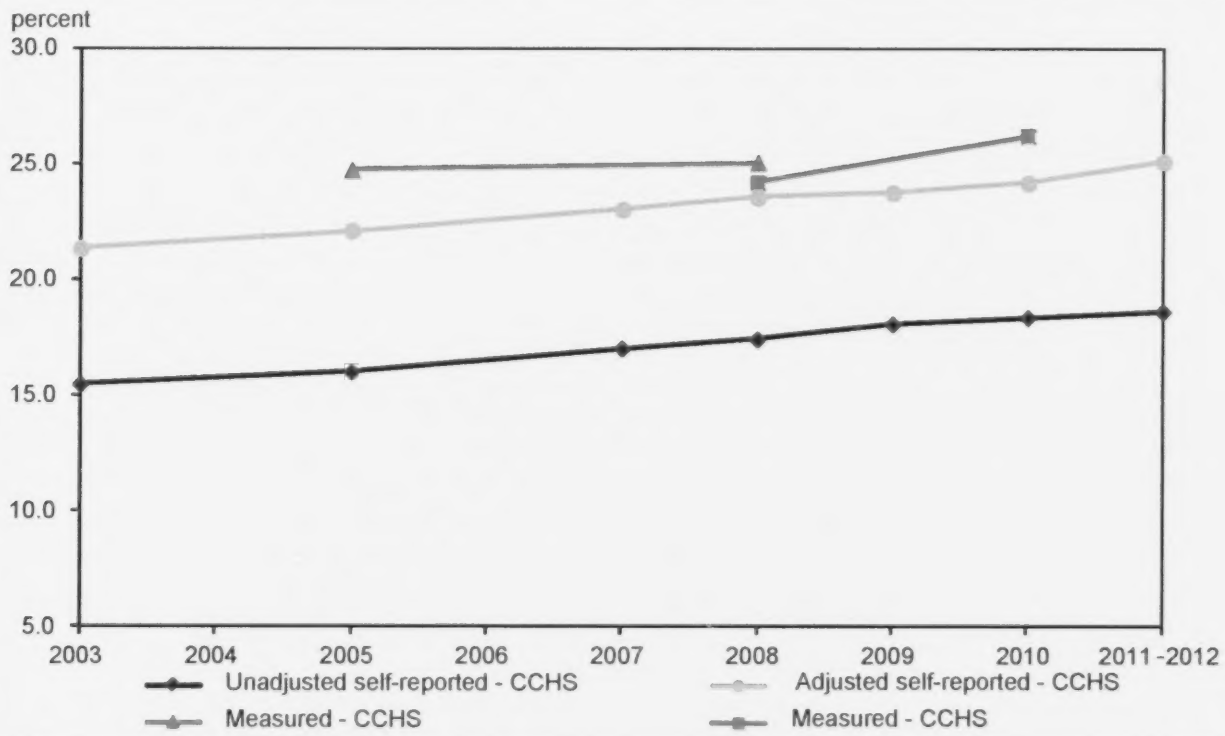
Correction equations were developed so that self-reported data, which offers the advantage of large sample size, could be adjusted for respondent biases to approximate measured estimates, which are more accurate.[10]

Measured, unadjusted self-reported, and adjusted self-reported estimates of obesity are shown in Chart 1. Measured data resulted in the highest estimates of obesity. Unadjusted self-reported data yielded the lowest estimates—seven to eight percentage points lower than the measured estimates. Adjusting this self-reported data produced national estimates more in line with the measured estimates.

Highest levels of obesity found in men and in the middle-aged

The adjusted prevalence of obesity among Canadians[11] aged 18 and over was 24.8% in 2011–2012. This means that

Chart 1
Prevalence of obesity, by type of estimate: unadjusted self-reported, adjusted self-reported, and measured; household population aged 18 to 79, Canada, 2003 to 2011–2012



Note: The Canadian Health Measures Survey (CHMS) collects data on a multi-year cycle; the Canadian Community Health Survey (CCHS) collects data yearly. Data from the CHMS are plotted in the middle of the time period during which it was collected. That is CHMS data collected from 2007 to 2009 are plotted at 2008, and data collected from 2009 to 2011 are plotted at 2010.
This chart presents statistics for the Canadian population aged 18 to 79 only. This is to enable comparison with the measured figures from the CHMS which does not collect data on individuals over the age of 79.

Source: Canadian Community Health Survey, cycles 2.1, 3.1, 4.1, 2008, 2009, 2010, 2011–2012; Canadian Health Measures Survey, cycles 1 and 2.

The correction equations

The correction equations used in this article were developed using the 2005 Canadian Community Health Survey. This survey included a sample of respondents whose height and weight were collected using both self-reported and measured data. These results were then compared to assess the level of bias between self-reported and measured data. The resulting correction equations were published in:

"The feasibility of establishing correction factors to adjust self-reported estimates of obesity" by Sarah Connor Gorber, Margot Shields, Mark S. Tremblay and Ian McDowell, Health Reports, September 2008, Statistics Canada Catalogue no. 82-003-X

The Gorber et al. article presents four possible correction methods. Because the bias differs between the sexes, each possible method produced different equations for males and females. This paper uses the 'Reduced Model 4' equations, as recommended by Gorber et al.

one in four adult Canadians, or approximately 6.3 million people, were obese, 17.5% more than in 2003.

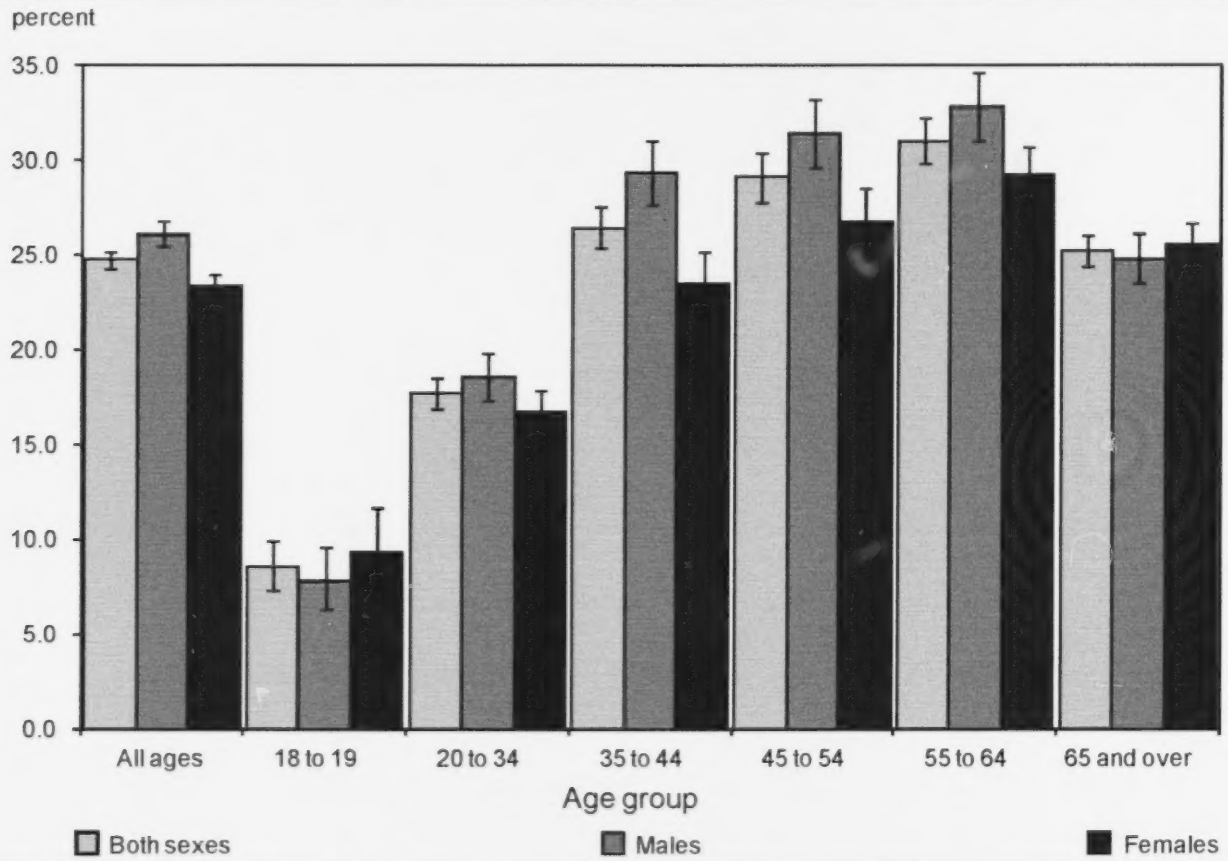
During 2011–2012, overall obesity levels were higher[12] for males, 26.1%, than for females, 23.4% (Chart 2). Males 35 and older had higher levels of obesity than females in that age range. However, among those aged 18 to 34, there were no differences in obesity between the sexes.

Over time, obesity has increased more for men than women. Between 2003 and 2011–2012, the prevalence of obesity rose 17.9% among men and 16.8% among women.

Age is also related to obesity. Considering both sexes together, those aged 18 to 34 were significantly less likely to be obese than any other age group. The middle-aged, those aged 35 to 64, were the most likely to be obese.

Obesity can be explored further by dividing it into three classes: Class I – BMI of 30.0 to 34.9; Class II – BMI of

Chart 2
Prevalence of obesity, adjusted self-reported, by age group and sex, household population aged 18 and over, Canada, 2011–2012



Note: The lines overlaid on the bars in this chart indicate the 95% confidence interval. They enable comparison of statistical differences between estimates.

Source: Canadian Community Health Survey, 2011–2012.

35.0 to 39.9; and Class III – BMI of 40.0 or more (see **About the body mass index**). Like overall obesity, the prevalence of Class III obesity, the level associated with the highest level of health risk, has increased, from 1.8% in 2003 to 2.5% in 2011–2012.

While a greater proportion of men were obese, women were more likely to be Class III obese: 3.0% of obese women were Class III compared to 2.0% of obese men. This reflects the fact that obese women, on average, had higher BMIs than obese men. The average BMI among obese women was 34.8; among obese men, 33.9.

Obesity in British Columbia and Quebec lower than national level

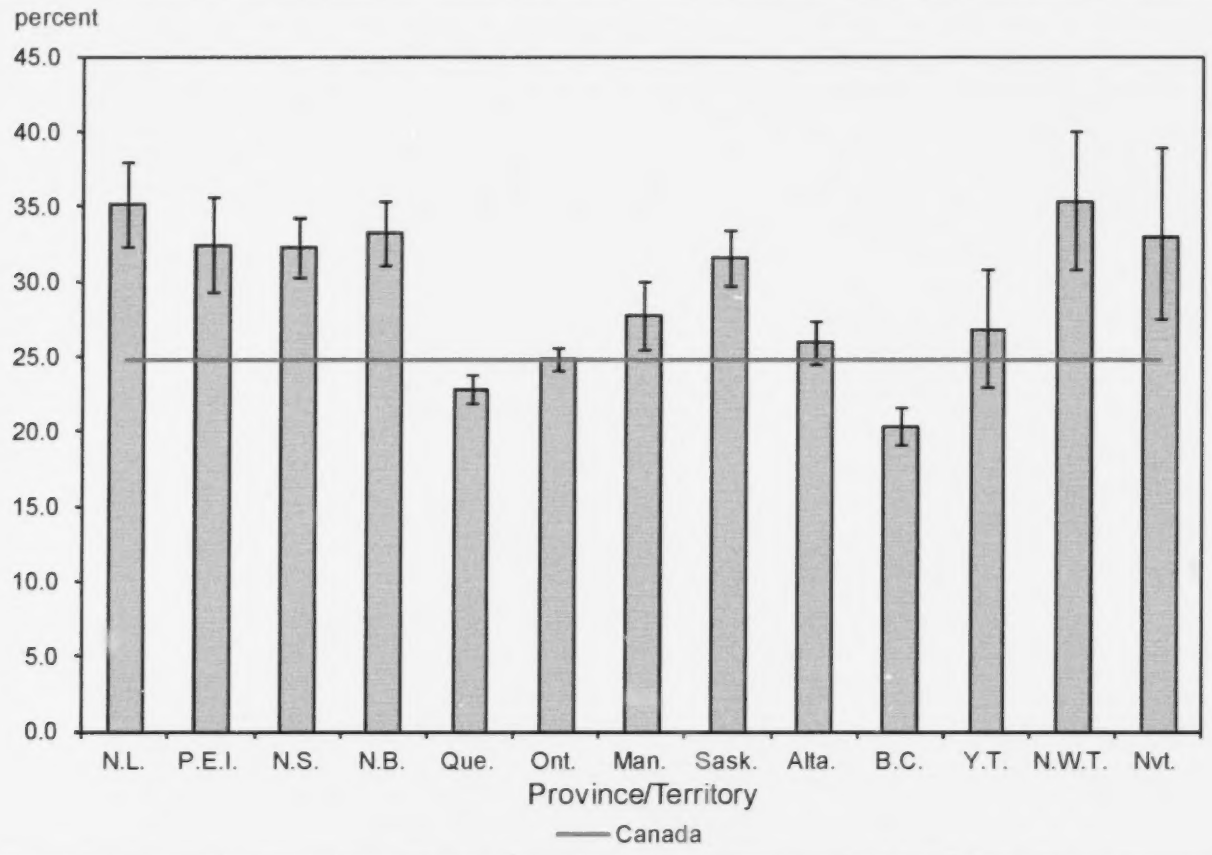
A major advantage of adjusting self-reported data is that it enables Statistics Canada to gather observations from larger samples of individuals. Larger samples are needed to produce estimates for smaller geographic areas, such as provinces and health regions.[13] It is not practical to collect such large samples of measured data,[14] but adjusting self-reported data can yield results that approximate measured data.

Across the country, the prevalence of obesity in the provinces varied greatly in 2011–2012 (Chart 3). Two provinces stand out for having the lowest levels of obesity—British Columbia, 20.4%, and Quebec, 22.8%.

Provinces/territories where obesity levels were higher than the national average were:

- Northwest Territories 35.3%
- Newfoundland and Labrador 35.2%
- New Brunswick 33.2%
- Nunavut 33.0%
- Prince Edward Island 32.4%

Chart 3
Prevalence of obesity, adjusted self-reported, by province/territory, household population aged 18 and older, Canada, 2011–2012



Note: The lines overlaid on the bars in this chart indicate the 95% confidence interval. They enable comparison of statistical differences between estimates.
Source: Canadian Community Health Survey, 2011–2012.

- Nova Scotia 32.3%
- Saskatchewan 31.6%
- Manitoba 27.7%.

The prevalence of obesity in Ontario, Alberta and Yukon did not differ from the national average. Previous research has found similar patterns of obesity distribution throughout the country.[15,16]

Broken down by sex, the data showed this same provincial pattern with one exception: the prevalence of obesity among women in Quebec, 22.3%, was not statistically different from the prevalence for all Canadian women. The lower level of obesity in Quebec appears to be the result of less obesity among the province's men, 23.3%, compared to Canadian men in general.

Less obesity in health regions containing major cities and in southern British Columbia

Provinces can be further divided into smaller geographic areas such as **health regions**. At this level of geography the variation in obesity was even greater, ranging from a low of 11.3% to a high of 40.8% (see Appendix A for a list of obesity prevalences by health region).

> **Health regions** are health administrative areas defined by provincial ministries of health. For complete Canadian coverage, each northern territory represents a health region. There were 110 health regions in 2012.[17]

The lowest levels of obesity were in health regions that contain Canada's three largest cities or their surrounding areas: Région de Montréal, 19.9%; York Regional Health Unit, 19.0%; City of Toronto Health Unit, 17.7%; and Vancouver Health Service Delivery Area, 11.3%. These obesity levels were all lower than the national prevalence of 24.8%. The remaining health regions with lower prevalences were all in British Columbia: South Vancouver Island Health Service Delivery Area, 20.1%; Richmond Health Service Delivery Area, 13.0%; and North Shore/Coast Garibaldi Health Service Delivery Area, 12.4%.

In contrast, 51 health regions had obesity levels that were higher than the national average (Figure 1 and Appendix A). The highest levels tended to be found in mostly rural health regions in the Atlantic and Prairie Provinces. The five health regions with the highest estimates were:

- Zone 7 (Miramichi area), New Brunswick 40.8%
- Mamawetan/Keewatin/Athabasca,Saskatchewan 40.3%
- Sunrise Regional Health Authority, Saskatchewan 39.9%
- Cape Breton District Health Authority, Nova Scotia 39.7%
- Northern Regional Health Authority, Manitoba 38.9%.

Lower than average obesity in Canada's three largest CMAs and other CMAs in British Columbia and Quebec

Obesity levels also varied considerably when using another type of geography—**census metropolitan areas** (CMAs)—to analyze patterns of obesity (see Table 1). These trends tended to mirror the results found at the provincial and health region level.

Table 1:
Prevalence of obesity, adjusted self-reported, by census metropolitan area, household population aged 18 and over, Canada, 2011–2012

Census Metropolitan Area	Prevalence (%)	95% confidence interval[1]
Saint John	38.1*	(32.3 to 44.3)
Greater Sudbury	33.8*	(29.0 to 39.0)
St. John's	33.2*	(28.2 to 38.6)
Brantford	32.1*	(25.8 to 39.0)
Hamilton	31.3*	(27.5 to 35.4)
Saskatoon	31.3*	(26.9 to 36.0)
Thunder Bay	30.7*	(26.5 to 35.2)
Oshawa	28.7	(24.5 to 33.4)
Windsor	27.7	(22.9 to 33.0)
Moncton	27.6	(23.2 to 32.5)
Regina	27.1	(23.2 to 31.5)
Halifax	27.0	(23.4 to 30.9)
St. Catharines–Niagara	27.0	(23.3 to 31.0)
London	25.8	(22.4 to 29.4)
Barrie	25.6	(21.4 to 30.3)
Peterborough	25.1	(20.2 to 30.6)
Canada	**24.8†**	**(24.3 to 25.2)**
Ottawa–Gatineau	24.5	(22.2 to 26.8)
Winnipeg	24.4	(21.3 to 27.8)
Edmonton	24.2	(21.4 to 27.2)
Abbotsford–Mission	23.9	(18.7 to 30.1)
Kitchener–Cambridge–Waterloo	23.7	(20.5 to 27.1)
Guelph	23.3	(18.8 to 28.6)
Trois-Rivières	22.4	(17.5 to 28.1)
Calgary	22.1	(19.5 to 25.0)
Montréal	21.5*	(19.9 to 23.1)
Kingston	21.2	(16.3 to 27.0)
Québec	20.9*	(18.5 to 23.6)
Saguenay	20.7	(17.0 to 25.0)
Toronto	20.2*	(18.8 to 21.6)
Sherbrooke	20.2	(16.2 to 24.8)
Victoria	19.6*	(16.4 to 23.2)
Vancouver	17.4*	(15.6 to 19.4)
Kelowna	17.0*	(12.7 to 22.4)

* significantly different from the reference category ($p < 0.05$)
† reference category
1. Confidence intervals indicate the precision of an estimate. Confidence intervals are usually set at 95%, which means that 95% of the time, the true value will fall within the confidence interval. Wide confidence intervals indicate that there is high variability associated with the estimate; thus, the estimate should be interpreted and compared with due caution. When two estimates have confidence intervals that overlap (i.e. a number can occur within both intervals) this means that there is no statistically significant difference between the estimates.

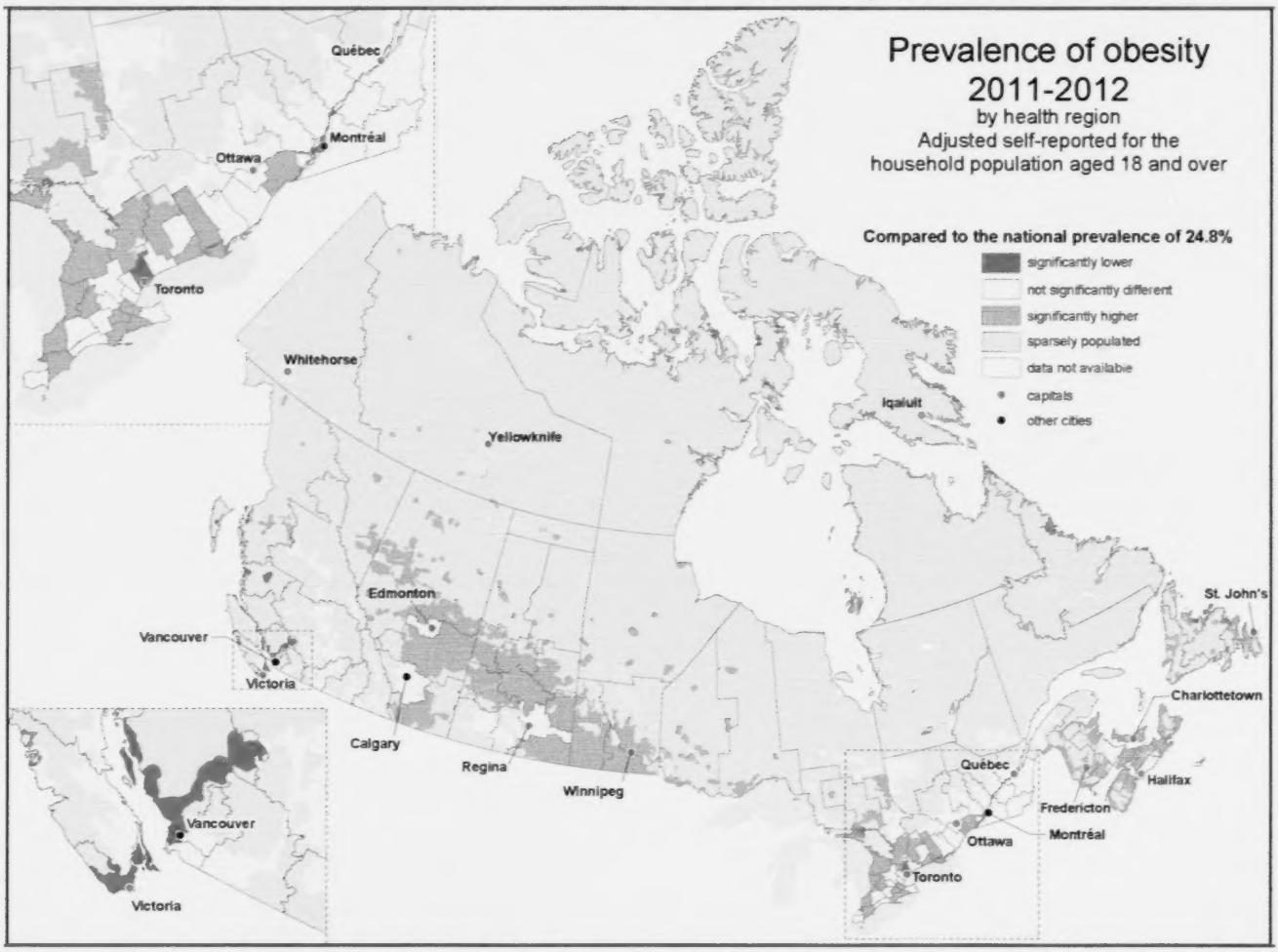
Source: Canadian Community Health Survey, 2011–2012.

Census metropolitan areas (CMAs) are formed by one or more adjacent municipalities centered on a population core. A CMA must have a total population of at least 100,000 of which 50,000 or more must live in the core. To be included in the CMA, other municipalities must have a high degree of social and economic integration with the core. There were 33 CMAs in Canada in 2012.

Levels of obesity lower than the 24.8% national average were found in the three largest CMAs—Toronto, Montreal, Vancouver—and other smaller CMAs in British Columbia and Quebec, specifically:

- Kelowna, British Columbia 17.0%
- Vancouver, British Columbia 17.4%
- Victoria, British Columbia 19.6%
- Toronto, Ontario 20.2%
- Québec, Quebec 20.9%
- Montréal, Quebec 21.5%.

Figure 1
Prevalence of obesity, adjusted self-reported, by province/territory, household population aged 18 and older, Canada, 2011–2012



Source: Canadian Community Health Survey, 2011-2012. Produced by the Geography Division for the Health Statistics Division, Statistics Canada, 2014.

In comparison, obesity levels tended to be higher than the national average in CMAs located in the Atlantic Provinces and in northern and southwestern Ontario, specifically in

- Saint John, New Brunswick 38.1%
- Greater Sudbury, Ontario 33.8%
- St. John's, Newfoundland and Labrador 33.2%
- Brantford, Ontario 32.1%
- Hamilton, Ontario 31.3%
- Saskatoon, Saskatchewan 31.3%
- Thunder Bay, Ontario 30.7%.

This paper provides a first overview of adjusted self-reported obesity estimates for various levels of geography. While these numbers do not account for differences in the demographic composition of geographic areas, previous research has found that the demographic structure of a population can be related to its prevalence of obesity.[18,19] These adjusted estimates may be used in future research to more fully explore disparities in obesity between geographic areas.

Summary

Estimates of obesity based on self-reported data tend to be lower than estimates based on measured data because of biases in how people report their weight and height. Self-reported data, which is less expensive and easier to obtain than measured data, can be adjusted to more closely reflect measured values.

Adjusted estimates for 2011–2012 show that the people most likely to be obese were males, those aged 35 to 64, and people who lived in the Prairies, the Territories, Atlantic Canada, or smaller cities in northern and southwestern Ontario. Conversely, Canadians aged 18 and 34, and people living in the three largest CMAs (Toronto, Montréal, Vancouver), as well as in southern British Columbia, were the least likely to be obese.

About the body mass index

The body mass index (BMI) is a commonly used method of assessing excess weight.[20] BMI is a ratio that consists of an individual's weight relative to their height. It is calculated by dividing a person's weight in kilograms by their height in meters squared.

$$BMI = \frac{weight\ in\ kilos}{height\ in\ metres^2}$$

BMI ranges are classified into categories based on health risk. This paper uses the classification system adopted by Health Canada and by the World Health Organization, which allows for comparisons between populations and makes it possible to identify individuals and groups at increased health risk.[3,4]

Table 2:
BMI classification by health risk

Category	BMI (kg/m2)	Risk of developing health problems
Underweight	Less than 18.5	Increased
Normal[1]	18.5 to 24.9	Least
Overweight	25.0 to 29.9	Increased
Obese – Class I	30.0 to 34.9	High
Obese – Class II	35.0 to 39.9	Very high
Obese – Class III	40.0 or more	Extremely high

1. For people 65 years of age and older the normal range may begin at a BMI slightly above 18.5 and extend into the overweight range.

Note: This classification system is not intended for use with people under 18 years of age or pregnant or lactating women.

Limitations of BMI

Although BMI is a widely used method for assessing excess weight, it has several limitations. BMI does not directly measure body fat, nor does it take into account the distribution of fat throughout the body.[4] Previous research has found that abdominal fat has a greater association with morbidity and mortality than fat located in other areas of the body.[4,21,22] In addition, BMI may not work as intended for certain groups of people, including those who are still growing, very lean, very muscular, very tall, or very short, as well as for certain ethnic and racial groups.[4]

Tanya Navaneelan and Teresa Janz are analysts with the Health Statistics Division.

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11. Pregnant women and respondents who did not provide a height or weight were excluded from the study population.
12. All differences reported in this article are significant at the 95% level.
13. The correction equation used in this analysis was based on national-level data. We have applied this equation to lower levels of geography. However, as data is mainly presented by BMI classification level and not specific BMI values, this should not significantly impact the results.
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Appendix

A. Prevalence of obesity, adjusted self-reported, by health region, household population aged 18 and over, Canada, 2011–2012

Code	Health region	Province/ territory	Prevalence (%)	95% confidence interval[1]
1307	Zone 7 (Miramichi area)	N.B.	40.8*	(33.1 to 49.0)
4714	Mamawetan / Keewatin / Athabasca	Sask.	40.3*	(33.1 to 48.0)
4705	Sunrise Regional Health Authority	Sask.	39.9*	(33.8 to 46.4)
1258	Cape Breton District Health Authority	N.S.	39.7*	(35.1 to 44.5)
4604	Northern Regional Health Authority	Man.	38.9*	(33.1 to 45.0)
1014	Labrador–Grenfell Regional Integrated Health Authority	N.L.	38.5*	(31.5 to 46.1)
1210	South Shore/ South West Nova	N.S.	38.2*	(33.8 to 42.9)
1302	Zone 2 (Saint John area)	N.B.	37.5*	(32.8 to 42.5)
3539	Huron County Health Unit	Ont.	37.1*	(30.8 to 43.8)
4603	Interlake–Eastern Regional Health Authority	Man.	36.5*	(31.2to 42.2)
1240	Pictou County/Guysborough Antigonish Strait	N.S.	36.3*	(31.5 to 41.5)
4710	Prairie North Regional Health Authority	Sask.	36.2*	(30.1 to 42.8)
1012	Central Regional Integrated Health Authority	N.L.	36.1*	(31.2 to 41.3)
1013	Western Regional Integrated Health Authority	N.L.	36.0*	(30.5 to 41.9)
6101	Northwest Territories	N.W.T.	35.3*	(30.8 to 40.2)
4707	Heartland Regional Health Authority	Sask.	35.1*	(29.4 to 41.1)
1223	Annapolis Valley District Health Authority	N.S.	35.0*	(29.1 to 41.5)
1304	Zone 4 (Edmundston area)	N.B.	34.7*	(27.6 to 42.6)
3563	Timiskaming Health Unit	Ont.	34.7*	(27.0 to 43.3)
4708	Kelsey Trail Regional Health Authority	Sask.	34.5*	(27.4 to 42.3)
1011	Eastern Regional Integrated Health Authority	N.L.	34.3*	(30.4 to 38.4)
1305	Zone 5 (Campbellton area)	N.B.	34.3*	(28.8 to 40.2)
1230	Colchester East Hants/ Cumberland	N.S.	34.0*	(28.8 to 39.7)
3561	Sudbury and District Health Unit	Ont.	34.0*	(29.6 to 38.6)
4605	Southern Health	Man.	34.0*	(30.1 to 38.1)
4701	Sun Country Regional Health Authority	Sask.	33.6*	(28.9 to 38.6)
3554	Perth District Health Unit	Ont.	33.4*	(27.4 to 40.0)
5951	Northwest Health Service Delivery Area	B.C.	33.2*	(28.2 to 38.5)
3558	The Eastern Ontario Health Unit	Ont.	33.0*	(29.4 to 36.9)
6201	Nunavut	Nvt.	33.0*	(27.6 to 39.0)
3540	Chatham–Kent Health Unit	Ont.	32.7*	(26.9 to 39.0)
3549	Northwestern Health Unit	Ont.	32.7*	(26.8 to 39.2)
4835	North Zone	Alta.	32.7*	(29.8 to 35.7)
1100	Prince Edward Island	P.E.I.	32.4*	(29.4 to 35.6)
1306	Zone 6 (Bathurst area)	N.B.	32.3*	(27.3 to 37.6)
1303	Zone 3 (Fredericton area)	N.B.	32.2*	(27.9 to 36.8)
3542	Lambton Health Unit	Ont.	32.2*	(27.3 to 37.4)
4833	Central Zone	Alta.	32.2*	(29.0 to 35.6)
3527	Brant County Health Unit	Ont.	32.1*	(25.8 to 39.0)
3534	Haldimand–Norfolk Health Unit	Ont.	32.1*	(27.6 to 37.0)
4706	Saskatoon Regional Health Authority	Sask.	31.9*	(27.8 to 36.2)
3535	Haliburton, Kawartha, Pine Ridge District Health Unit	Ont.	31.6*	(27.2 to 36.4)
4602	Prairie Mountain Health	Man.	31.5*	(27.4 to 35.9)
3562	Thunder Bay District Health Unit	Ont.	31.3*	(27.3 to 35.4)
3537	City of Hamilton Health Unit	Ont.	31.1*	(26.4 to 36.1)
3538	Hastings and Prince Edward Counties Health Unit	Ont.	31.1*	(26.7 to 35.8)
4709	Prince Albert Parkland Regional Health Authority	Sask.	31.1*	(25.3 to 37.5)
5953	Northeast Health Service Delivery Area	B.C.	31.1*	(25.3 to 37.5)
3526	District of Algoma Health Unit	Ont.	30.8	(23.5 to 39.2)
4703	Cypress Regional Health Authority	Sask.	30.5	(24.7 to 37.0)
5952	Northern Interior Health Service Delivery Area	B.C.	30.5	(25.0 to 36.6)
3543	Leeds, Grenville and Lanark District Health Unit	Ont.	30.4	(24.5 to 36.9)
3533	Grey Bruce Health Unit	Ont.	30.3*	(26.1 to 35.0)
3557	Renfrew County and District Health Unit	Ont.	30.0	(24.4 to 36.3)
4831	South Zone	Alta.	29.9*	(26.6 to 33.3)

3552	Oxford County Health Unit	Ont.	29.6	(24.1 to 35.8)
3556	Porcupine Health Unit	Ont.	29.6	(24.5 to 35.3)
5911	East Kootenay Health Service Delivery Area	B.C.	29.4	(24.2 to 35.3)
3568	Windsor–Essex County Health Unit	Ont.	29.2	(24.2 to 34.7)
3560	Simcoe Muskoka District Health Unit	Ont.	29.1*	(26.0 to 32.5)
3536	Halton Regional Health Unit	Ont.	29.0	(24.4 to 34.1)
1301	Zone 1 (Moncton area)	N.B.	28.8	(25.2 to 32.8)
4704	Regina Qu'Appelle Regional Health Authority	Sask.	28.4	(24.7 to 32.4)
2409	Région de la Côte-Nord	Que.	28.2	(24.1 to 32.6)
2411	Région de la Gaspésie-Îles-de-la-Madeleine	Que.	28.1	(24.1 to 32.4)
2408	Région de l'Abitibi-Témiscamingue	Que.	28.0	(24.2 to 32.2)
3546	Niagara Regional Area Health Unit	Ont.	27.8	(24.3 to 31.6)
3530	Durham Regional Health Unit	Ont.	27.7	(23.4 to 32.4)
3547	North Bay Parry Sound District Health Unit	Ont.	27.5	(22.4 to 33.2)
3531	Elgin–St. Thomas Health Unit	Ont.	27.3	(22.9 to 32.2)
1269	Capital District Health Authority	N.S.	26.9	(23.5 to 30.7)
3566	Wellington–Dufferin–Guelph Health Unit	Ont.	26.8	(22.6 to 31.4)
6001	Yukon	Y.T.	26.8	(23.1 to 30.9)
4702	Five Hills Regional Health Authority	Sask.	26.1	(21.2 to 31.7)
2407	Région de l'Outaouais	Que.	26.0	(22.3 to 30.1)
2404	Région de la Mauricie et du Centre-du-Québec	Que.	25.5	(22.0 to 29.4)
2414	Région de Lanaudière	Que.	25.5	(22.3 to 29.1)
3544	Middlesex–London Health Unit	Ont.	25.5	(21.9 to 29.5)
5942	Central Vancouver Island Health Service Delivery Area	B.C.	25.5	(21.7 to 29.8)
	Canada†		**24.8**	**(24.3 to 25.2)**
3555	Peterborough County-City Health Unit	Ont.	24.7	(20.0 to 30.1)
2410	Région du Nord-du-Québec	Que.	24.6	(20.2 to 29.6)
3551	City of Ottawa Health Unit	Ont.	24.5	(21.8 to 27.5)
5943	North Vancouver Island Health Service Delivery Area	B.C.	24.5	(19.7 to 30.1)
2413	Région de Laval	Que.	24.2	(20.7 to 28.1)
4834	Edmonton Zone	Alta.	24.2	(21.4 to 27.2)
5923	Fraser South Health Service Delivery Area	B.C.	24.0	(19.0 to 29.9)
3565	Waterloo Health Unit	Ont.	23.8	(20.9 to 26.9)
4601	Winnipeg Regional Health Authority	Man.	23.8	(20.5 to 27.3)
5921	Fraser East Health Service Delivery Area	B.C.	23.8	(19.3 to 29.1)
2416	Région de Montérégie	Que.	23.7	(21.0 to 26.5)
5914	Thompson/Cariboo Health Service Delivery Area	B.C.	23.6	(18.9 to 29.0)
3553	Peel Regional Health Unit	Ont.	23.5	(21.0 to 26.2)
3541	Kingston, Frontenac and Lennox and Addington Health Unit	Ont.	23.3	(18.6 to 28.8)
2415	Région de Laurentides	Que.	23.1	(19.9 to 26.6)
2402	Région du Saguenay-Lac-Saint-Jean	Que.	23.0	(19.7 to 26.7)
4832	Calgary Zone	Alta.	22.9	(20.4 to 25.7)
2405	Région de l'Estrie	Que.	22.5	(18.5 to 27.2)
2412	Région de la Chaudière-Appalaches	Que.	22.2	(19.0 to 25.8)
2403	Région de la Capitale-Nationale	Que.	21.6	(19.0 to 24.5)
2401	Région du Bas-Saint-Laurent	Que.	21.3	(17.5 to 25.6)
5912	Kootenay–Boundary Health Service Delivery Area	B.C.	21.2	(16.6 to 26.8)
5922	Fraser North Health Service Delivery Area	B.C.	21.0	(17.5 to 25.0)
5913	Okanagan Health Service Delivery Area	B.C.	20.8	(16.7 to 25.7)
5941	South Vancouver Island Health Service Delivery Area	B.C.	20.1*	(16.9 to 23.7)
2406	Région de Montréal	Que.	19.9*	(17.7 to 22.4)
3570	York Regional Health Unit	Ont.	19.0*	(16.2 to 22.0)
3595	City of Toronto Health Unit	Ont.	17.7*	(15.6 to 19.9)
5931	Richmond Health Service Delivery Area	B.C.	13.0*	(9.5 to 17.6)
5933	North Shore/Coast Garibaldi Health Service Delivery Area	B.C.	12.4*	(8.9 to 17.1)
5932	Vancouver Health Service Delivery Area	B.C.	11.3*	(9.3 to 13.7)

† reference category

* significantly different from the reference category ($p < 0.05$)

‡ Confidence intervals indicate the precision of an estimate. Confidence intervals are usually set at 95%, which means that 95% of the time, the true value will fall within the confidence interval. Wide confidence intervals indicate that there is high variability associated with the estimate, thus, the estimate should be interpreted and compared with due caution. When two estimates have confidence intervals that overlap (i.e. a number can occur within both intervals) this means that there is no statistically significant difference between the estimates.

Source: Canadian Community Health Survey, 2011–2012.